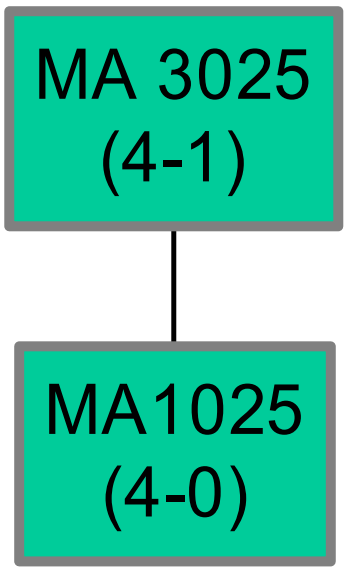
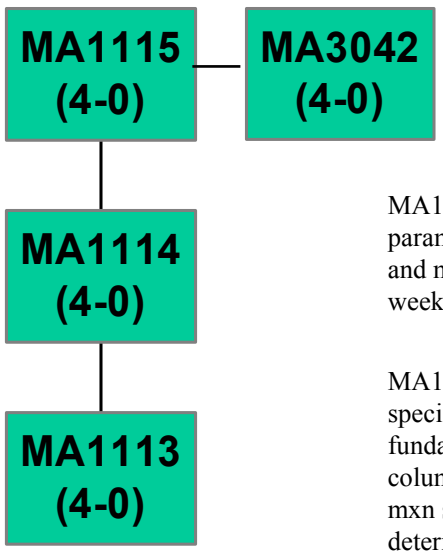
MA3025 Course Prerequisites



MA3025 (4-1) Logic and Discrete Mathematics: Provides a rigorous foundation in logic and elementary discrete mathematics. Topics from logic include modeling English propositions, propositional calculus, quantification, and elementary predicate calculus. Additional topics include elements of set theory, mathematical induction, relations and functions, and elements of number theory. Prerequisite: MA1025 or MAR125.

MA1025(4-0) Finite Mathematics for Operations Research: An introductory course in logic and elementary discrete mathematics to be taken by students in Operations Research, Mathematics, and Computer Science.Considerable emphasis is placed on propositional and predicate logic and on techniques of proof in mathematics. Mathematical topics include sets, functions, and relations. Coverage of combinatories includes an introduction to permutations, combinations, the pigeon-hole principle, and the principle of inclusion/exclusion. No previous experience with this material is assumed. PREREQUISITE: None.

MA3042 Course Prerequisites



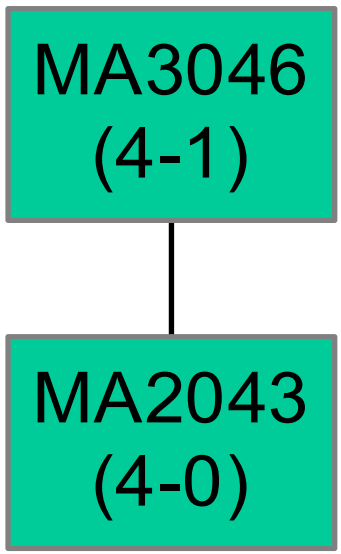
MA3042 (4-0) Linear Algebra: Finite-dimensional vector spaces, linear dependence, basis and dimension, change of basis. Linear transformations and similarity. Scalar product, inner product spaces. Orthogonal subspaces and least squares. LU (with pivoting), Cholesky, and QR factorizations. Eigenvalues/eigenvectors, diagonalization. Hermitian matrices, quadratic forms, definite matrices. Vector and matrix norms, orthogonal transformations, condition numbers. PREREQUISITES: MA1115 may be taken concurrently.

MA1115 (4-0) Multivariable Calculus: Vector algebra and calculus, directional derivative, gradient, polar coordinates and parametric equations, functions of several independent variables, limits, continuity, partial derivatives, chain rule, maxima and minima, double and triple integrals, cylindrical and spherical coordinate systems. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1114.

MA1114 (4-0) Single Variable Calculus II with Matrix Algebra: Topics in Calculus include applications of integration, special techniques of integration, infinite series, convergence tests, and Taylor series. Matrix algebra topics covered are: the fundamental algebra of matrices including addition, multiplication of matrices, multiplication of a matrix by a constant and a column (vector) by a matrix; elementary matrices and inverses, together with the properties of these operations; solutions to mxn systems of linear algebraic equations using Gaussian elimination and the LU decomposition (without pivoting); determinants, properties of determinants; and a brief introduction to the arithmetic of complex numbers and DeMoivre's theorem. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1113.

MA1113 (4-0) Single Variable Calculus I: Review of analytic geometry and trigonometry, functions of one variable, limits, derivatives, continuity and differentiability; differentiation of algebraic, trigonometric, logarithmic and exponential functions with applications to maxima and minima, rates, differentials; product rule, quotient rule, chain rule; anti-derivatives, integrals and the fundamental theorem of calculus; definite integrals, areas. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: Pre-Calculus mathematics

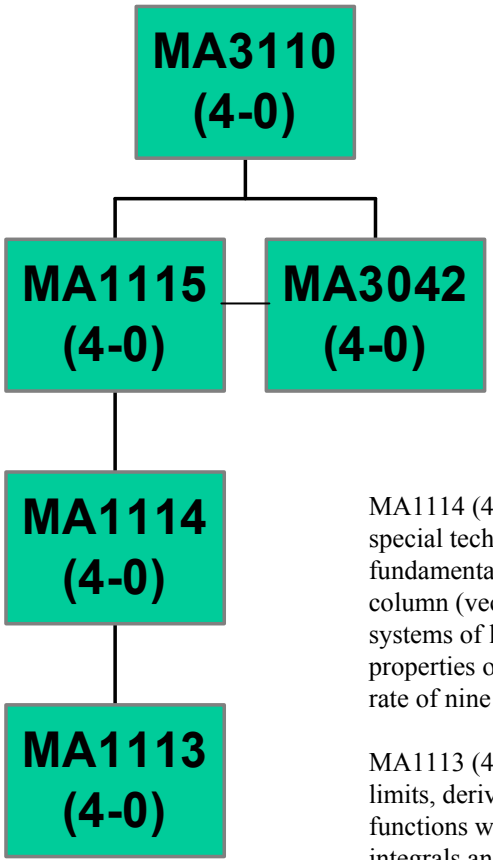
MA3046 Course Prerequisites



MA3046 (4-1) Matrix Analysis: This course provides students in the engineering and physical sciences curricula with an applications-oriented coverage of major topics of matrix and linear algebra. Matrix factorizations (LU, QR, Cholesky), the Singular Value Decomposition, eigenvalues and eigenvectors, the Schur form, subspace computations, structured matrices. Understanding of practical computational issues such as stability, conditioning, complexity, and the development of practical algorithms. PREREQUISITES: MA2043 and EC1010

MA2043 (4-0) Introduction to Matrix and Linear Algebra: The fundamental algebra of vectors and matrices including addition, scaling, and multiplication. Block operations with vectors and matrices. Algorithms for computing the LU (Gauss) factorization of an nxm matrix, with pivoting. Matrix representation of systems of linear equations and their solution via the LU factorization. Basic properties of determinants. Matrix inverses. Linear transformations and change of basis. The four fundamental subspaces and the fundamental theorem of linear algebra. Introduction to eigenvalues and eigenvectors. PREREQUISITES: Students should have mathematical background at the level generally expected of someone with a B.S. in Engineering, i.e. familiarity with Calculus and solid algebra skills.

MA3110 Course Prerequisites



MA3110 (4-0) Intermediate Analysis: Multi-variable calculus integrated with linear algebra. Functions of several variables, continuous transformations, Jacobians, chain rule, implicit function theorem, inverse function theorem, extreme, optimization and Lagrange multiplier technique, difference equations, and convex sets & functions. Applications in Operations Research. PREREQUISITES: MA1115 & MA3042.

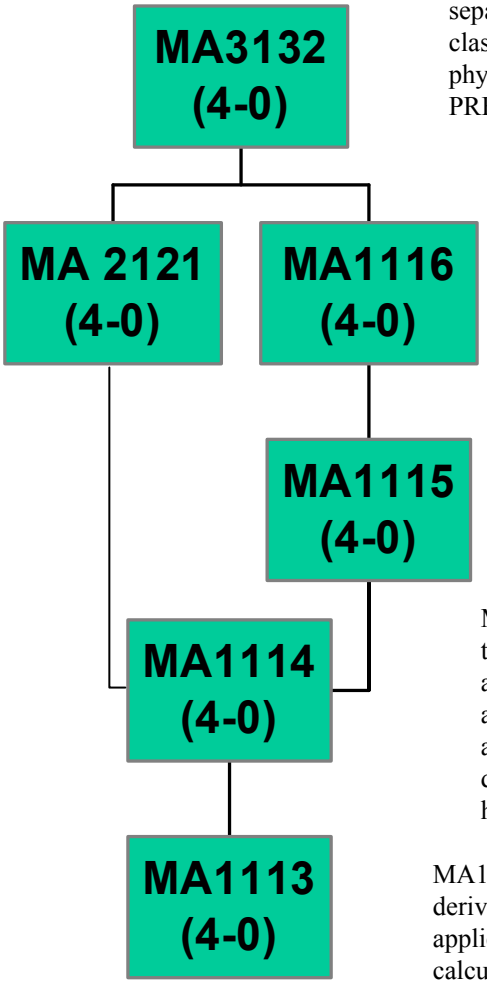
MA3042 (4-0) Linear Algebra: Finite-dimensional vector spaces, linear dependence, basis and dimension, change of basis. Linear transformations and similarity. Scalar product, inner product spaces. Orthogonal subspaces and least squares. LU (with pivoting), Cholesky, and QR factorizations. Eigenvalues/eigenvectors, diagonalization. Hermitian matrices, quadratic forms, definite matrices. Vector and matrix norms, orthogonal transformations, condition numbers. PREREQUISITES: MA1115 may be taken concurrently.

MA1115 (4-0) Multivariable Calculus: Vector algebra and calculus, directional derivative, gradient, polar coordinates and parametric equations, functions of several independent variables, limits, continuity, partial derivatives, chain rule, maxima and minima, double and triple integrals, cylindrical and spherical coordinate systems. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1114.

MA1114 (4-0) Single Variable Calculus II with Matrix Algebra: Topics in Calculus include applications of integration, special techniques of integration, infinite series, convergence tests, and Taylor series. Matrix algebra topics covered are: the fundamental algebra of matrices including addition, multiplication of matrices, multiplication of a matrix by a constant and a column (vector) by a matrix; elementary matrices and inverses, together with the properties of these operations; solutions to mxn systems of linear algebraic equations using Gaussian elimination and the LU decomposition (without pivoting); determinants, properties of determinants; and a brief introduction to the arithmetic of complex numbers and DeMoivre's theorem. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1113

MA1113 (4-0) Single Variable Calculus I: Review of analytic geometry and trigonometry, functions of one variable, limits, derivatives, continuity and differentiability; differentiation of algebraic, trigonometric, logarithmic and exponential functions with applications to maxima and minima, rates, differentials; product rule, quotient rule, chain rule; anti-derivatives, integrals and the fundamental theorem of calculus; definite integrals, areas. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: Pre-Calculus mathematics.

MA3132 Course Prerequisites



MA3132 (4-0) Partial Differential Equations and Integral Transforms: Solution of boundary value problems by separation of variables; Sturm-Liouville problems; Fourier and Bessel series solutions, Fourier transforms; classification of second-order equations; applications, method of characteristics. Applications to engineering and physical science. Satisfies the ESR in differential equations for the Applied Mathematics program. PREREQUISITE: MA2121 and MA1116.

MA2121(4-0) Differential Equations: Ordinary differential equations: linear and nonlinear (first order) equations, homogeneous and non-homogeneous equations, linear independence of solutions, power series solutions, systems of differential equations, Laplace transforms. Applications include radioactive decay, elementary mechanics, mechanical and electrical oscillators, oscillations and resonance. PREREQUISITES: MA1114.

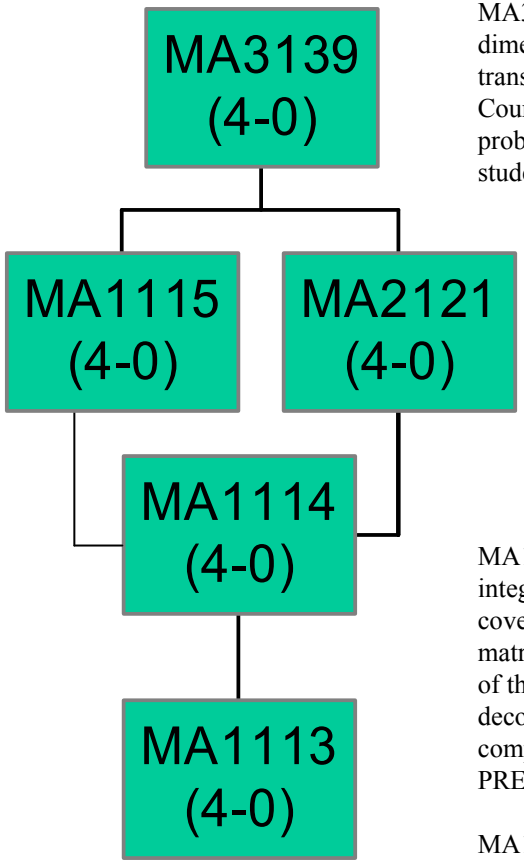
MA1116 (3-0) Vector Calculus: Calculus of vector fields; directional derivative, gradient, divergence, curl; potential fields; Green's, Stokes', and the divergence integral theorems. Applications in engineering and physics. Taught at the rate of seven hours per week for five weeks. PREREQUISITES: MA1115.

MA1115 (4-0) Multivariable Calculus: Vector algebra and calculus, directional derivative, gradient, polar coordinates and parametric equations, functions of several independent variables, limits, continuity, partial derivatives, chain rule, maxima and minima, double and triple integrals, cylindrical and spherical coordinate systems. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1114

MA1114 (4-0) Single Variable Calculus II with Matrix Algebra.: Topics in Calculus include applications of integration, special techniques of integration, infinite series, convergence tests, and Taylor series. Matrix algebra topics covered are: the fundamental algebra of matrices including addition, multiplication of matrices, multiplication of a matrix by a constant and a column (vector) by a matrix; elementary matrices and inverses, together with the properties of these operations; solutions to mxn systems of linear algebraic equations using Gaussian elimination and the LU decomposition (without pivoting); determinants, properties of determinants; and a brief introduction to the arithmetic of complex numbers and DeMoivre's theorem. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1113.

MA1113 (4-0) Single Variable Calculus I: Review of analytic geometry and trigonometry, functions of one variable, limits, derivatives, continuity and differentiability, differentiation of algebraic, trigonometric, logarithmic and exponential functions with applications to maxima and minima, rates, differentials: product rule: anti-derivatives, integrals and the fundamental theorem of calculus: definite integrals,areas. Taught at the rate of nine hours per week for five weeks. PREEREQUISITES: Pre-Calculus mathematics.

MA3139 Course Prerequisites



MA3139 (4-0) Fourier Analysis and Partial Differential Equations: Fourier series; solution of the one and two-dimensional wave equations, D'Alembert's solution, frequency and time domain interpretations; Fourier integral transforms and applications to ordinary and partial differential equations and linear systems; Convolution theorems. Course covers basic material essential for signal processing, filtering, transmission, waveguides, and other related problems. Applications include spectral analysis of electronic signals, e.g. radar or sonar. Designed for UW and EW/IW students. PREREQUISITES: MA1115 and MA2121.

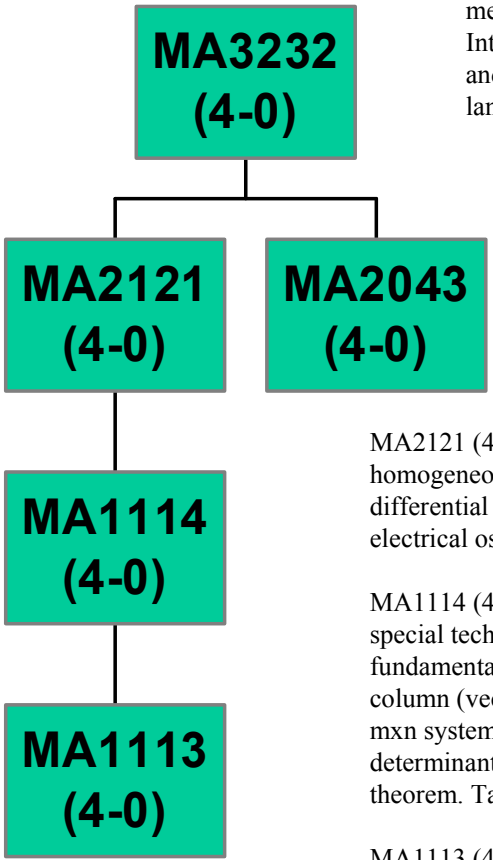
MA2121 (4-0) Differential Equations: Ordinary differential equations: linear and nonlinear (first order) equations, homogeneous and non-homogeneous equations, linear independence of solutions, power series solutions, systems of differential equations, Laplace transforms. Applications include radioactive decay, elementary mechanics, mechanical and electrical oscillators, forced oscillations and resonance. PREREQUISITES: MA1114.

MA1115 (4-0) Multivariable Calculus: Vector algebra and calculus, directional derivative, gradient, polar coordinates and parametric equations, functions of several independent variables, limits, continuity, partial derivatives, chain rule, maxima and minima, double and triple integrals, cylindrical and spherical coordinate systems. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1114.

MA1114 (4-0) Single Variable Calculus II with Matrix Algebra: Topics in Calculus include applications of integration, special techniques of integration, infinite series, convergence tests, and Taylor series. Matrix algebra topics covered are: the fundamental algebra of matrices including addition, multiplication of matrices, multiplication of a matrix by a constant and a column (vector) by a matrix; elementary matrices and inverses, together with the properties of these operations; solutions to mxn systems of linear algebraic equations using Gaussian elimination and the LU decomposition (without pivoting); determinants, properties of determinants; and a brief introduction to the arithmetic of complex numbers and DeMoivre's theorem. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1113

MA1113 (4-0) Single Variable Calculus I: Review of analytic geometry and trigonometry, functions of one variable, limits, derivatives, continuity and differentiability; differentiation of algebraic, trigonometric, logarithmic and exponential functions with applications to maxima and minima, rates, differentials; product rule, quotient rule, chain rule; anti-derivatives, integrals and the fundamental theorem of calculus; definite integrals, areas. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: Pre-Calculus mathematics

MA3232 Course Prerequisites



MA3232 (4-0) Numerical Analysis: Provides the basic numerical tools for understanding more advanced numerical methods. Topics for the course include: Source and Analysis of Computational Error, Solution of Nonlinear Equations, Interpolation, Numerical Integration and Differentiation, and Numerical Solution of Ordinary Differential Equations and Boundary Value Problems. PREREQUISITES: MA2121, MA2043, and ability to program in a high level language such as Fortran, C, or MATLAB. Credit cannot be obtained for both MA3232 and MA3243.

MA2043 (4-0) Introduction to Matrix and Linear Algebra: The fundamental algebra of vectors and matrices including addition, scaling, and multiplication. Block operations with vectors and matrices. Algorithms for computing the LU (Gauss) factorization of an nxm matrix, with pivoting. Matrix representation of systems of linear equations and their solution via the LU factorization. Basic properties of determinants. Matrix inverses. Linear transformations and change of basis. The four fundamental subspaces and the fundamental theorem of linear algebra. Introduction to eigenvalues and eigenvectors. PREREQUISITES: Students should have mathematical background at the level generally expected of someone with a B.S. in Engineering, i.e. familiarity with Calculus and solid algebra skills.

MA2121 (4-0) Differential Equations: Ordinary differential equations: linear and nonlinear (first order) equations, homogeneous and non-homogeneous equations, linear independence of solutions, power series solutions, systems of differential equations, Laplace transforms. Applications include radioactive decay, elementary mechanics, mechanical and electrical oscillators, forced oscillations and resonance. PREREQUISITES: MA1114.

MA1114 (4-0) Single Variable Calculus II with Matrix Algebra: Topics in Calculus include applications of integration, special techniques of integration, infinite series, convergence tests, and Taylor series. Matrix algebra topics covered are: the fundamental algebra of matrices including addition, multiplication of matrices, multiplication of a matrix by a constant and a column (vector) by a matrix; elementary matrices and inverses, together with the properties of these operations; solutions to mxn systems of linear algebraic equations using Gaussian elimination and the LU decomposition (without pivoting); determinants, properties of determinants; and a brief introduction to the arithmetic of complex numbers and DeMoivre's theorem. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: MA1113.

MA1113 (4-0) Single Variable Calculus I: Review of analytic geometry and trigonometry, functions of one variable, limits, derivatives, continuity and differentiability; differentiation of algebraic, trigonometric, logarithmic and exponential functions with applications to maxima and minima, rates, differentials; product rule, quotient rule, chain rule; anti-derivatives, integrals and the fundamental theorem of calculus; definite integrals, areas. Taught at the rate of nine hours per week for five weeks. PREREQUISITES: Pre-Calculus mathematics.